



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/567,626	12/13/2006	Zsolt Nenyey	AGXG-1-PCT-US	2517
22827	7590	10/01/2009		
DORITY & MANNING, P.A. POST OFFICE BOX 1449 GREENVILLE, SC 29602-1449			EXAMINER DEHNE, AARON A	
			ART UNIT	PAPER NUMBER
			2829	
			MAIL DATE	DELIVERY MODE
			10/01/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/567,626	Applicant(s) NENYEI ET AL.	
	Examiner Aaron A. Dehne	Art Unit 2829	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 February 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 17-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 17-32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>2/8/2006</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 17-32 rejected under 35 U.S.C. 103(a) as being unpatentable over Mount *et al.* (WO 99/34033 A2) in view of Ji (US 2004/0018684 A1).

In re claim 17, Mount discloses a process for detaching an oxygen-containing and/or nitrogenous layer (Pg. 4, lines 3-6) on a semiconductor (Pg. 2, line 31-32) or metal surface (Pg. 2, lines 19-30), comprising: contacting at least a part of the surface with a water-free nitrogenous liquid (Pg. 6, lines 1-4). Although Mount is silent on separating the surface from the liquid, it would have been obvious to one having ordinary skill in the art at the time the invention was made to separate the surface from the liquid at the conclusion of the process to continue any further manufacturing steps, if necessary, to produce a usable product. Mount discloses substantially all limitations except for wherein the water-free nitrogenous liquid comprises a fluorine-containing substance, whereas Ji discloses (Abstract) an etching solution comprising NH_4F . It would have

been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Mount to include NH_4F in the nitrogenous liquid because NH_4F etching solutions increase dielectric-to-silicon selectivity (Abstract), advantageously etching only oxide layers while not damaging silicon features on the substrate, as taught by Ji.

In re claim 18, Mount discloses application of an electrical voltage between the surface ("working electrode," Pg. 6, line 10), the liquid ("supporting electrode," line 12), and an electrode ("reference electrode," Pg. 6, line 15) to a given voltage-time curve (Pg. 6, lines 27-33).

In re claim 19, Mount discloses wherein the nitrogenous liquid consists of nitrogen and hydrogen ("liquid ammonia," Pg. 6, lines 1-2).

In re claim 20, Mount discloses wherein the nitrogenous liquid comprises NH_3 ("liquid ammonia," Pg. 6, lines 1-2).

In re claim 21, Mount discloses wherein the nitrogenous liquid is free from dissolved or molecularly bound oxygen, free from water, or both (Pg. 6, lines 1-4).

In re claim 22, Mount discloses wherein the surface is part of a semiconductor substrate which essentially comprises silicon (Pg. 2, lines 31-37).

In re claim 23, Mount discloses wherein apart from nitrogen, the nitrogenous liquid only contains the elements hydrogen, oxygen, fluorine, or carbon or combinations and/or compounds of these elements or their isotopes (Pg. 6, lines 1-2).

In re claim 24, Mount discloses wherein the surface comprises structures (“protecting layer of surface oxide,” Pg. 6, lines 27-28).

In re claim 25, Ji discloses wherein an oxygen-containing compound 160 is at least partially removed from a surface prior to contacting the surface with a nitrogenous liquid (§ 0035-0036, Abstract).

In re claim 26, Ji discloses (§ 0034) wherein an oxygen-containing compound 160 comprises SiO_x or SiO_2 .

In re claim 27, Mount discloses wherein the electrical voltage comprises a DC voltage component or a time-voltage profile of between 0 V and 20 V (Pg. 6, lines 27-33), and that the metal or semiconductor surface forms an anode with respect to at least one electrode (Pg. 6, lines 27-33). The Examiner considers Mount’s “working electrode” (Pg. 6, line 29) to be equivalent to the claimed anode.

In re claim 28, Mount discloses wherein the surface is subjected to a thermal step after the separation step (Pg. 8, lines 35-36 – Pg. 9, lines 1-8). The Examiner notes that the surface which has a nitride film formed thereon subsequent to the oxide removal is subjected to SQUID testing wherein the testing comprises lowering the temperature of

the sample to <4.5K (Fig. 5). The Examiner interprets this process to meet the limitation of a thermal step.

In re claim 29, Mount discloses wherein the electrical voltage between the surface and at least one electrode comprises an alternating voltage (Pg. 6, lines 29-33).

In re claim 30, Mount discloses wherein the oxygen-containing is detached from the surface in situ by the nitrogenous liquid (Pg. 11, line 13; Pg. 6, lines 1-29).

In re claim 31, Ji discloses wherein a nitrogenous liquid comprises NH_4F (Abstract).

In re claim 32, the combined teaching of Mount and Ji discloses a semiconductor substrate treated in accordance with claim 17 (Pg. 2, lines 31-37, Mount).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Aaron A. Dehne whose telephone number is (571) 270-7880. The examiner can normally be reached on Monday-Friday 7:30am-5:00pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ha T. Nguyen can be reached on (571) 272-1678. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Aaron A Dehne/
Examiner, Art Unit 2829

/Ha T. Nguyen/
Supervisory Patent Examiner, Art Unit 2829